

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460



OFFICE OF CHEMICAL SAFETY AND
POLLUTION PREVENTION

MEMORANDUM

Date: March 14, 2013

SUBJECT: Determination of Transferable Residues on Turf Treated with 2,4-D DMA, MCPA DMA, 2,4-D DMA + MCPP-p DMA + Dicamba DMA and MCPA DMA + MCPP-p DMA + 2,4-DP-p DMA

PC Codes: 030001 (2,4-D)

Decision No.: 459422

Petition No.: NA

Risk Assessment Type:

TXR No.: NA

DP Barcode: D410012

Registration No.: 2217-2, 34704-130

Regulatory Action: NA

Case No.: NA

CAS No.: 2008-39-1 (2,4-D DMA), 2039-46-5 (MCPA DMA), 66423-09-4 (MCPP-p DMA), 2300-66-5 (Dicamba DMA), 53404-32-3 (2,4-DP-p DMA)

40 CFR: NA

MRID No.: 45033101

FROM: Alexandra LaMay *A LaMay*
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This document serves as a data evaluation record for the 2,4-D, MCPA, MCPP, dicamba, and 2,4-DP turf transferable residue study, "Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA, MCPA DMA, 2,4-D DMA + MCPP-p DMA + Dicamba DMA and MCPA DMA + MCPP-p DMA + 2,4-DP-p DMA". The study was conducted according to the provided protocol and OPPTS Series 875, Occupational and Residential Exposure Test Guidelines, Group B: Post-application Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turf. The primary study review was conducted by Versar, Inc, under the guidance of HED. A secondary review was conducted by HED and reflects current Agency policies.

Trials were conducted at two locations in the United States (Tulare County, California and Dane County, Wisconsin). Residues were sampled using the modified California cloth roller technique. Triplicate TTR samples were collected from the treated plots before the application, at 1, 4, 8, and 12 hrs after the application, and then at 1, 2, 3, 4, and 7 days after the application. TTRs were corrected using the average concurrent recovery for 2,4-D, MCPA, MCPP, dicamba, or 2,4-DP from each site. A linear regression analysis was not performed due to the nature of the dissipation pattern (i.e. peak residues generally observed at the 8- or 12-hr sampling interval).

STUDY TYPE: Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA, MCPA DMA, 2,4-D DMA + MCPP-p DMA + Dicamba DMA and MCPA DMA + MCPP-p DMA + 2,4-DP-p DMA: OPPTS 875.2100

PC CODE: 030001 (2,4-D)

TEST MATERIAL

- **Amine 400 2,4-D Weed Killer** is a liquid formulation containing 46.47% 2,4-D DMA.
- **Clean Crop® MCP Amine 4** is a liquid formulation containing 52% MCPA DMA, which corresponds to 42.5% acid equivalent (ae) MCPA.
- **EH-1358 Herbicide** is a multiple active ingredient (MAI) liquid formulation containing 11.98% 2,4-D DMA, 4.55% MCPP-p DMA, and 1.54% dicamba DMA, which corresponds to 9.95% ae 2,4-D, 3.76% ae MCPP, and 1.28% ae MCPP.
- **Triamine II optical** is a MAI liquid formulation containing 17.50% MCPA DMA, 9.07% MCPP-p DMA, and 8.70% 2,4-DP-p DMA, which corresponds to 14.3% ae MCPA, 7.5% ae MCPP-p, and 7.3% ae 2,4-DP-p.

SYNONYMS:

- 2,4-D DMA; dimethylamine 2,4-dichlorophenoxyacetate; CAS No. 2008-39-1
- MCPA DMA; dimethylamine 2-methyl-4-chlorophenoxyacetate; CAS No. 2039-46-5
- MCPP-p DMA; dimethylamine (R+)-2-(2-methyl-4-chlorophenoxy)propionate; CAS No. 66423-09-4
- Dicamba DMA; dimethylamine 3,6-dichloro-o-anisate; CAS No. 2300-66-5
- 2,4-DP-p DMA; dimethylamine (R+)-2-(2,4-dichlorophenoxy)propionate; CAS No. 53404-32-3

CITATION:

Authors:	Donald Hughes and Darcie Bomkamp
Title:	Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA, MCPA DMA, 2,4-D DMA + MCPP-p DMA + Dicamba DMA and MCPA DMA + MCPP-p DMA + 2,4-DP-p DMA
Report Date:	January 27, 2000
Analytical Laboratory:	Covance Laboratories Inc. 3301 Kinsman Boulevard Madison, Wisconsin 53704
Identifying Codes:	Sponsor Study Number BTH TFR TF 003; Covance Study Number 6926-105; MRID 45033101; Unpublished

SPONSOR: Broadleaf Turf Herbicide TFR Task Force LLC
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EXECUTIVE SUMMARY:

This study was designed to determine the transferable turf residue (TTR) of 2,4-D, MCPA, MCPP, dicamba, and 2,4-DP dislodged from turf treated with the following test substances:

- **Amine 400 2,4-D Week Killer:** a liquid formulation containing 46.47% 2,4-D DMA;
- **Clean Crop MCP Amine 4:** a liquid formulation containing 52% MCPA DMA, which corresponds to 42.5% acid equivalent (ae) MCPA;
- **EH-1358 Herbicide:** a multiple active ingredient (MAI) liquid formulation containing 11.98% 2,4-D DMA, 4.55% MCPP-p DMA, and 1.54% dicamba DMA, which corresponds to 9.95% ae 2,4-D, 3.76% ae MCPP, and 1.28% ae MCPP; and
- **Triamine II Optical:** a MAI liquid formulation containing 17.50% MCPA DMA, 9.07% MCPP-p DMA, and 8.70% 2,4-DP-p DMA, which corresponds to 14.3% ae MCPA, 7.5% ae MCPP-p, and 7.3% ae 2,4-DP-p.

Trials were conducted at two locations in the United States (Tulare County, California and Dane County, Wisconsin), with each site consisting of five established turf plots, including one control plot (TRT1) and one plot for each of the test substances (TRT2 – TRT5). The treatment plots each received a single broadcast application of the test substance using ground equipment in a spray volume of ~10 GPA, at the following target application rates:

- **TRT 2:** Amine 400 2,4-D Weed Killer at 1.67 lb ae/A 2,4-D DMA;
- **TRT 3:** Clean Crop MCP Amine 4 at 1.50 lb ae/A MCPA DMA;
- **TRT 4:** EH-1358 Herbicide at 1.67 lb ae/A 2,4-D DMA + 0.63 lb ae/A MCPP-p DMA + 0.21 lb ae/A dicamba DMA; and
- **TRT 5:** Triamine II Optical at 1.50 lb ae/A MCPA DMA + 0.79 lb ae/A MCPP-p DMA + 0.77 lb ae/A 2,4-DP-p DMA.

Residues were sampled using the modified California cloth roller technique. Triplicate TTR samples were collected from the treated plots before the application, at 1, 4, 8, and 12 hrs after the application, and then at 1, 2, 3, 4, and 7 days after the application. The application method and monitoring times were relevant to the use pattern proposed. Additionally, climatic and other site conditions were relevant to the proposed use pattern.

Field fortification was conducted at both sites, however, the results were not reported in the study because the Registrant concluded that they were to be adversely affected by the acid interaction of the fortification solution with the cotton during storage.

TTR samples were analyzed using a GC/MS method with a validated limit of quantitation (LOQ) of 0.000879 $\mu\text{g}/\text{cm}^2$ and a limit of detection (LOD) of 0.0000879 $\mu\text{g}/\text{cm}^2$ for each analyte. The Registrant provided TTRs in ng/cm^2 . The Registrant did not correct the data for laboratory recoveries. Versar corrected the TTRs using the average concurrent recovery for 2,4-D, MCPA, MCPP, dicamba, or 2,4-DP from each site. TTR values reported as below the LOD were assigned a value of $\frac{1}{2}$ LOD and values between the LOD and the LOQ were assigned a value of $\frac{1}{2}$ LOQ.

At the CA site, the highest average TTR values occurred 12 hrs after the application and residues were still above the LOQ at the last sampling interval (7 days after treatment; DAT) for all analytes and all treatments. At the WI site, the highest average TTR values occurred 1 hr after application for TRT 2 and TRT 3, and 8 hrs after application for TRT 4 and TRT 5 (except for MCPP in TRT 4, in which the highest average residue occurred 1 hr after application). Residues dropped to below the LOQ by 1DAT for all analytes and all treatments at the WI site. The lower residues and earlier maximum TTR values at the WI site are likely due to rainfall during sampling. Rain began to fall lightly during the 8-hr sampling interval, after samples for treatments 1 and 2 had been collected. TTR cloths collected in treatments 3-5 were damp from the falling rain during sampling. A total of 0.025 inch fell by the end of the 8-hr sampling

interval. An additional 0.145 inches fell between the 8- and 12-hr sampling (0.17 inch total for the day). All subsequent TFR samples were damp resulting from humid conditions (dew or overnight rainfall). A summary of the highest average TTR values for each treatment type is provided below.

- **TRT 2 (Amine 400 2,4-D Weed Killer):** The highest average TTR values (and percent of application rate) for 2,4-D were 0.571 $\mu\text{g}/\text{cm}^2$ (3.06%) at the CA site and 0.236 $\mu\text{g}/\text{cm}^2$ (1.28%) at the WI site.
- **TRT 3 (Clean Crop MCP Amine 4):** The highest average TTR values (and percent of application rate) for MCPA were 1.04 $\mu\text{g}/\text{cm}^2$ (6.28%) at the CA site and 0.134 $\mu\text{g}/\text{cm}^2$ (0.798%) at the WI site.
- **TRT 4 (EH-1358 Herbicide):** The highest average TTR values (and percent of application rate) were 1.08 $\mu\text{g}/\text{cm}^2$ (5.81%) for 2,4-D, 0.396 $\mu\text{g}/\text{cm}^2$ (5.68%) for MCPP, and 0.160 $\mu\text{g}/\text{cm}^2$ (6.84%) for dicamba at the CA site; corresponding TTR values (and percent application rate) at the WI site were 0.184 $\mu\text{g}/\text{cm}^2$ (1.00%) for 2,4-D, 0.051 $\mu\text{g}/\text{cm}^2$ (0.745%) for MCPP, and 0.026 $\mu\text{g}/\text{cm}^2$ (1.13%) for dicamba.
- **TRT 5 (Triamine II Optical):** The highest average TTR values (and percent of application rate) were 1.67 $\mu\text{g}/\text{cm}^2$ (10.1%) for MCPA, 1.01 $\mu\text{g}/\text{cm}^2$ (12.0%) for 2,4-DP, and 0.911 $\mu\text{g}/\text{cm}^2$ (10.5%) for MCPP at the CA site; corresponding TTR values (and percent application rate) at the WI site were 0.993 $\mu\text{g}/\text{cm}^2$ (5.98%) for MCPA, 0.565 $\mu\text{g}/\text{cm}^2$ (6.65%) for 2,4-DP, and 0.487 $\mu\text{g}/\text{cm}^2$ (5.57%) for MCPP.

The Registrant did not perform a regression analysis on the data generated in this study. Versar also did not perform a linear regression analysis due to the nature of the dissipation pattern (i.e. peak residues generally observed at the 8- or 12-hr sampling interval).

This study met the majority of the Series 875.2100 Guidelines. The following minor issues of concern are noted:

- The production of metabolites, breakdown products, or the presence of contaminants of concern were not discussed in the Study Report.
- The EPA guidelines recommend that initiating testing immediately before rainfall should be avoided. At the Wisconsin location, rain began to fall lightly during the 8-hr sampling interval, after samples for treatments 1 and 2 had been collected. Therefore, TTR cloths collected in treatments 3-5 were damp from the falling rain during sampling. A total of 0.025 inch fell by the end of the 8 hr sampling. An additional 0.145 inches fell between the 8- and 12-hr sampling interval (0.17 inch total for the day). All subsequent TTR samples were damp resulting from humid conditions (dew or overnight rainfall). Residues declined to <LOQ by 1 day after treatment.
- The test product Amine 400 2,4-D Weed Killer (TRT 2) was applied at a rate of 1.67 lb ae/A, which is slightly higher than the maximum label rate of 1.5 lb ae/A for turf applications. It is unknown whether applications made with EH-1358 Herbicide (TRT 4) and Triamine II Optical (TRT 5) were at the maximum label rate, as labels were not provided.
- The results from this study are based on findings from only two test sites; the EPA guidelines recommend using three geographically distinct locations for each formulation.
- At the Wisconsin site, temperature, precipitation, wind speed, and humidity data were not provided for the duration of the study. Temperature, rainfall, and wind velocity was provided

for the day of application.

- The recoveries obtained from the field fortifications were very low and were not reported or used for correction of field data. The study authors thought the low recoveries were a result of interference caused by the acid interaction of the fortification solution with the cotton during storage.
- Raw residue data should be corrected for field fortification recovery levels up to 120%. Field fortification data was not provided and no corrections were performed by the petitioner. Versar corrected the TTRs using the average concurrent recovery for 2,4-D, MCPA, MCPP, dicamba, or 2,4-DP from each site.

COMPLIANCE:

Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided. The study sponsor waived claims of confidentiality within the scope of FIFRA Section 10 (d)1(A), (B), or (C). The Study Report indicated that the study was conducted under EPA Good Laboratory Practice Standards (40 CFR Part 160), with the following exceptions: weather (CA site only), field site history, and historical pesticide data were not collected under GLP standards and some CA data entries were not initialed or dated at the time of entry.

CONCURRENT EXPOSURE STUDY: No

GUIDELINE OR PROTOCOL FOLLOWED: This study was conducted according to the provided protocol and OPPTS Series 875, Occupational and Residential Exposure Test Guidelines, Group B: Post-application Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turf. A compliance checklist is provided in Appendix A.

I. MATERIALS AND METHODS

A. MATERIALS:

- Test Material:** Information on the test materials and reference substances is provided in Table 1.

Table 1. Test Material						
End-Use-Product	Formulation	Active Ingredient ¹	Batch/Lot # of Test Substance	Purity of Reference Substance	Expiration Date ²	CAS #
Amine 400 2,4-D Weed Killer (TRT 2)	Liquid	46.47% 2,4-D DMA	5322	2,4-D: 99.25%	Test substance: 4/2001 Reference substance: 2/2000	2008-39-1
Clean Crop MCP Amine 4 (TRT 3)	Liquid	42.5% MCPA	4PL70033	MCPA: 98.47%	Test substance: 4/2001 Reference substance: 2/2000	2039-46-5
EH-1358 Herbicide (TRT 4)	Liquid	9.95% 2,4-D; 3.76% MCPP; 1.28% Dicamba	NB20964	2,4-D: 99.25%; MCPP: 100.00%; Dicamba: 98.78%	Test substance: 4/2001 Reference substances: 2/2000	2008-39-1 + 66423-09-4 + 2300-66-5
Triamine II optical (TRT 5)	Liquid	14.3% MCPA; 7.5% MCPP-p; 7.3% 2,4-DP-p	992502	MCPA: 98.47%; MCPP: 100.00%; 2,4-DP: 98.72%	Test substance: 4/2001 Reference substances: 2/2000	2039-46-5 + 66423-09-4 + 2300-66-5

¹% Active ingredient reported as acid equivalent (ae) for TRTs 3, 4, and 5.

² A Certificate of Analysis for the test substance was not provided.

2. Relevance of Test Material to Proposed Formulation(s):

The test product used in **TRT 2** was Amine 400 2,4-D Weed Killer, containing 46.47% 2,4-D DMA. A label was not provided with the Study Report; however, Versar was able to locate a label on EPA's PPLS website. TRT 2 reflects a slightly higher treatment rate than the proposed maximum label rate (1.67 vs 1.5 lb ae/A) for Spring application use on turf. The test product is the same as the proposed formulation. The test product used in **TRT 3** was Clean Crop MCP Amine 4, containing 52% MCPA DMA (equivalent to 42.5% ae MCPA). A label was not provided with the Study Report; however, Versar was able to locate a label on EPA's PPLS website. TRT 3 reflects the proposed maximum label rate for Spring application use on turf. The test product is the same as the proposed formulation. The test product used in **TRT 4** was EH-1358 herbicide, containing 11.98% DMA salt of 2,4-D, 4.55% DMA salt of MCPP-p, and 1.54% DMA salt of dicamba (equivalent to 9.95% ae 2,4-D, 3.76% ae MCPP, and 1.28% ae dicamba). A label was not provided with the Study Report and Versar was not able to locate a label on EPA's PPLS website. The test product used in **TRT 5** was Triamine II optical, containing 17.50% DMA salt of MCPA, 9.07% DMA salt of MCPP-p, and 8.70% DMA salt of 2,4-DP (equivalent to 14.3% ae MCPA, 7.5% ae MCPP-p, and 7.3% ae 2,4-DP-p). A label was not provided with the Study Report and Versar was not able to locate a label on EPA's PPLS website.

B. STUDY DESIGN:

The study protocol (BTH TFR TF 003), signed on April 5-9, 1999, was provided with the Study Report. There were two amendments to the protocol and five reported protocol deviations. The protocol amendments involved: (1) fixing minor typographical errors in the protocol; and (2) providing the correct units for the monitoring pads and correcting sample numbers in Appendices A and B. The protocol deviations involved: (1) only one fresh fortification was analyzed with the tank mix samples; (2) sample set 510 WI 2023 was not diluted, resulting in values not bracketed by the standard curve; (3) at the CA site, plots were mowed four days prior to application, instead of the 1-2 days prior to application as stated in the protocol; (4) at the WI site, the turf was cut with a non-mulching rotary mower and turf height was not measured at the first four sampling intervals; and (5) at the WI site, the one hour sampling interval was collected at one-hour and 15 minutes after the second application.

1. Site Description:

Test locations:

The field phase of the study was conducted at two locations: Dane County, WI (NAFTA Region 5) and Tulare County, CA (NAFTA Region 10). The test sites were said to be representative of typical growing areas for turf with respect to soil type and climate. One control plot and four treated plots, divided into thirty-nine (CA) or forty-four (WI) replicate subplots each, were established at each test site. According to a diagram included in the report, the treated plots were located approximately 1,500 feet from the control plot at the CA site and approximately 199 feet from the control plot at the WI site.

Areas sprayed and sampled:

California: The treated plots measured 20 ft x 52 ft. The treated plots were split into 39 subplots measuring 4 x 5 ft. A 2.5 ft buffer was established between subplots 1-13, 14-26, and 27-39.

Wisconsin: The treated plots measured 15 ft x 70 ft. The treated plots were split into 44 subplots measuring 5 x 3 ft. A 5 ft buffer was established between subplots 1-22 and 23-44.

Meteorological Data:

Meteorological data at application were provided for both sites (air temperatures, relative humidity, soil temperature, wind speed, wind direction, cloud cover, and soil moisture); however, meteorological for the entire trial period were only provided for the California site (daily average minimum and maximum temperatures, precipitation amounts, wind speed, and relative humidity). Historical meteorological data were not provided in the study report for either site; therefore, it is not certain if temperatures and precipitation were comparable to the 10-year historical average weather data. Irrigation use was not reported.

At the California location, daily temperatures ranged from 47-83 °F and total rainfall during the trial period was 0.00 inches. The turf was dry before sampling at each interval, with the exception of the 12-hr sampling where visibility of moisture on the cloth samples was the result of heavy dew.

At the Wisconsin location, the petitioner noted that rain began to fall lightly during the 8-hr sample collection interval, after samples from TRT 1 and TRT 2 plots had been collected. TTR cloths collected in treatments 3-5 were damp from the falling rain during sampling. A total of 0.025 inch fell by the end of the 8 hr sampling. An additional 0.145 inch fell between the 8 and 12 hr sampling (0.17 inch total for the day). All subsequent TFR samples were damp resulting from humid conditions (dew or overnight rainfall). Rain fell between the 12 hr and 1 day sampling intervals, 2 and 3 day sampling intervals, 3 and 4 day sampling intervals, and 4 and 7 day sampling intervals.

2. Surface Monitored:

Turf Species:

California: Superior dwarf fescue. Sod used in TRTs 2 and 3 was rolled on December 19, 1997 and sod used in TRTs 4 and 5 was rolled on June 11, 1997.

Wisconsin: Kentucky Blue Grass (Adelphi, Banff, Chateau, and Cynthia; 25% of each), planted in 1996.

Residential or Public Area:

The test sites were located at commercial testing facilities and consisted of typical turf grass.

Other relevant characteristics:

The plots were mowed to a height of 2 inches four days prior to application at the California site and one day prior to application at the Wisconsin site.

Other products used on turf: Maintenance chemicals and fertilizers were not applied to the test plots during the trial period at either trial site. In addition, no pesticides were applied during the year prior to study initiation.

3. Physical State of Formulation as Applied:

Amine 400 2,4-D Weed Killer, Clean Crop MCP Amine 4, EH-1358 Herbicide, and Triamine II Optical are liquid formulations.

4. Application Rates and Regimes:

Application rate(s): The target and actual application rates are provided in Table 2 for each treatment plot.

Table 2. Application Rate						
TRT	Compound	Target Application Rate (lb ae/A)	California site		Wisconsin site	
			Actual Application Rate (lb ae/A)	% Target	Actual Application Rate (lb ae/A)	% Target
2	2,4-D DMA	1.67	1.67	99.7	1.65	98.7
3	MCPA DMA	1.50	1.48	98.6	1.49	99.7
4	2,4-D DMA + MCPP-p DMA + Dicamba DMA	1.67 + 0.63 + 0.21	1.66 + 0.62 + 0.21	99.3-99.5	1.64 + 0.61 + 0.21	97.9
5	MCPA DMA + MCPP-p DMA + 2,4-DP-p DMA	1.50 + 0.79 + 0.77	1.47 + 0.78 + 0.75	98.2-98.4	1.48 + 0.78 + 0.76	98.8-98.9

Application Regime: California: One broadcast spray application was made to each treated plot on April 20, 1999.
Wisconsin: One broadcast spray application was made to each treated plot on June 8, 1999.

Application Equipment: California: The test substance was applied using a tractor mounted sprayer equipped with twelve nozzles spaced 20 inches apart.
Wisconsin: The test substance was applied using a self-propelled bicycle mounted sprayer equipped with 6 nozzles spaced 15 inches apart.

Spray Volume: California: A spray volume of ~10 GPA was used for the application.
Wisconsin: A spray volume of 9.42-9.57 GPA was used for the applications.

Equipment Calibration Procedures: The sprayer was calibrated prior to application by the volume/time method. Calibration occurred on the day of application at the Wisconsin site; the date of calibration was not reported at the California site.

Was application "watered in"?	The application was not watered in using irrigation equipment.
Was total deposition measured?	Total deposition was measured during this study using monitoring pads. Eight spray pads were placed evenly throughout each of the treated plots. Immediately after application, the monitoring pads were collected, folded to keep the exposed surface on the inside, and placed into plastic coated glass bottles. The monitoring pads were shipped frozen to the analytical laboratory. The spray pads verified 59-146% of the theoretical concentrations. The low recovery of 59% was for 2,4-D from TRT 2 at the WI site; the high recovery of 146% was for dicamba from TRT 4 at the CA site. The remaining recoveries ranged from 69-122% of the theoretical.

5. Transferable Residue Sampling Procedures:

Method and Equipment:	Cloth dosimeter samples were collected from the treated plots using the modified California cloth roller technique, following the Outdoor Residential Exposure Task Force (ORETF) recommendations. Sampling equipment included the modified California roller (32 pounds), sampling media frame, 27 x 39 inch cloth dosimeters (actual 24.5 x 36 inch sample area or 5,691 cm ²) and disposable plastic sheeting.
Sampling Procedure:	Transferable turf samples were collected from randomly selected subplots. Samples were obtained using the modified California cloth roller technique which utilizes a 32 lb roller, which is rolled 5 times over the cloth dosimeter. The dosimeter is in contact with the turf and separated from the roller by disposable plastic sheeting. After rolling, the cloth dosimeter was removed and the sheet was then folded to keep the exposed surface on the inside and placed in labeled plastic zip-lock bags.
Surface area(s) sampled:	The surface area of the cloth dosimeters which came in contact with the treated turf when placed in the sampling frame was 5,691 cm ² .
Replicates per surface:	
– Replicates per sampling time:	At each sampling interval, three treated replicate samples were collected from the treated plots and one sample was collected from the control plots.
– Number of sampling times:	There were a total of 10 sampling events, including one sampling event before the application.
Times of sampling:	Samples were collected prior to the test substance then after application at 1, 4, 8, and 12 hours post-application, and at 1, 2, 3, 4, and 7 days post-application.

6. Sample Handling:

After collection, each sample was carefully folded with the exposed sides together, and placed in a zip-lock bag. The samples were stored frozen (interval between collection and freezing not reported) and then shipped on dry ice via overnight Federal Express (CA site) or in transport freezers via hand delivery (AZ site) within 7 days to Covance Laboratories for analysis. At Covance they were maintained under frozen conditions (-30 to -10 ° C) until there were extracted and analyzed.

The field portion of the California study was conducted between April 20, 1999 and April 28, 1999. The field portion of the Wisconsin study was conducted between June 8, 1999 and June 15, 1999. All analyses were conducted at Covance Laboratories between April 13, 1999 and July 29, 1999. Treated samples were stored for 2 to 48 days prior to extraction. The interval between extraction and analysis was not reported.

7. Analytical Methodology:

Extraction method: Residues in the cloth dosimeter samples were extracted and analyzed using a gas chromatography with a mass selective detector (GC/MSD) method. Briefly, the residues were extracted from the cloth using acidic acetone. An aliquot of the extract was concentrated, made acidic, and extracted with dichloromethane. The dichloromethane was concentrated and methylated with diazomethane. Residues in the methylated fraction were determined by GC/MSD.

Detection methods: All samples were analyzed using GC/MSD. A summary of the typical GC/MSD conditions are shown in Table 3.

Table 3. Typical GC/MSD Instrument Parameters	
Instrument:	Hewlett-Packard 6890 Gas Chromatograph/Models 5970 and 5973 Mass Selective Detector
Column:	30 m x 0.25 mm i.d., 0.25 µm film thickness
Injection Volume:	2 µl
Carrier Gas:	Ultra high purity helium
Flow Rate:	1 ml/minute
Temperatures:	Injector: 225°C Transfer line: 280°C Column: Initial: 90°C for 1 minute Rate: 8°C/min Final: 280°C
Injection volume	2 µL
Expected Retention Times:	Not Reported
Run Time:	Not Reported

Method validation: The method for analysis of the TTR samples was entitled "Determination of Phenoxy Herbicides on Percal Cotton Cloth using Gas Chromatography with Mass Selective Detection" (signed April 7, 1999). For control cotton percale samples fortified with a mix of 2,4-D, MCPP, and dicamba, average recoveries were 90% for 2,4-D, 102% for MCPP and 98.2% for dicamba. For control cotton percale samples fortified with a mix of MCPA, MCPP, and 2,4-DP, average recoveries were 96.9% for MCPA, 101% for MCPP and 101% for 2,4-DP.

For each analyte, the validated LOQ was 0.000879 $\mu\text{g}/\text{cm}^2$; the limit of detection (LOD) was 0.0000879 $\mu\text{g}/\text{cm}^2$.

Instrument performance: A five-point calibration curve ranging from 0.0400 to 0.800 $\mu\text{g}/\text{mL}$ was prepared by injecting constant volumes of calibration standard solutions. The calibration curve was created based on linear regression. Additional standards were analyzed through the course of the analysis to ensure the validity of the response curve.

Quantification: Quantitation of residues in all samples was achieved by using a calibration curve calculated by linear regression of instrument responses for each of the reference substances at multiple concentrations.

8. Quality Control:

Lab Recovery: Concurrent laboratory fortified samples were analyzed with each set of field samples. Control cloth samples were fortified with 2,4-D, MCPA, 2,4-DP, MCPP, and dicamba at nominal concentrations ranging from 0.000879 to 1.76 $\mu\text{g}/\text{cm}^2$.

At the California site, individual concurrent laboratory recoveries ranged from 88.8% to 127% with an overall mean recovery of $103\% \pm 11.8\%$ ($n=17$) for 2,4-D, from 70.8% to 123% with an overall mean recovery of $96.7\% \pm 13.8\%$ ($n=17$) for MCPA, 69.7% to 111% with an overall mean recovery of $93.0\% \pm 15.7\%$ ($n=9$) for 2,4-DP, from 69.5% to 123% with an overall mean recovery of $96.6\% \pm 14.9\%$ ($n=18$) for MCPP, and from 75.9% to 122% with an overall mean recovery of $101\% \pm 15.3\%$ ($n=9$) for dicamba.

At the Wisconsin site, individual concurrent laboratory recoveries ranged from 58.0% to 114% with an overall mean recovery of $87.7\% \pm 14.1\%$ ($n=18$) for 2,4-D, from 77.6% to 123% with an overall mean recovery of $98.0\% \pm 13.1\%$ ($n=16$) for MCPA, 85.7% to 118% with an overall mean recovery of $99.8\% \pm 13.1\%$ ($n=8$) for 2,4-DP, from 86.2% to 123% with an overall mean recovery of $103\% \pm 12.2\%$ ($n=18$) for MCPP, and from 68.8% to 109% with an overall mean recovery of $96.1\% \pm 11.3\%$ ($n=10$) for dicamba.

Field blanks: One control sample was collected at each sampling interval from the untreated plots. Residues of 2,4-D, MCPA, MCPP, 2,4-DP, and dicamba were all below the LOQ in the untreated control samples.

Field recovery: Field fortification samples were prepared at two concentrations using control cloth dosimeters fortified with each individual analyte. Samples were prepared prior to application and 6 days after application. The nominal fortification levels were 0.004 $\mu\text{g}/\text{cm}^2$ and 0.04 $\mu\text{g}/\text{cm}^2$. These samples were stored and analyzed with the test samples. The recoveries obtained from the field fortifications were very low and were not reported or used for correction of field data. These low recoveries were thought to be the result of interference caused by the acid interaction of the fortification solution with the cotton during storage.

Formulation: **TRT 2:** Amine 400 2,4-D Weed Killer is a liquid formulation containing

46.47% 2,4-D DMA.

TRT 3: Clean Crop[®] MCP Amine 4 is a liquid formulation containing 52% MCPA DMA, which corresponds to 42.5% acid equivalent (ae) MCPA.

TRT 4: EH-1358 Herbicide is a MAI liquid formulation containing 11.98% 2,4-D DMA, 4.55% MCPP-p DMA, and 1.54% dicamba DMA, which corresponds to 9.95% ae 2,4-D, 3.76% ae MCPP, and 1.28% ae MCPP.

TRT 5: Triamine II optical is a MAI liquid formulation containing 17.50% MCPA DMA, 9.07% MCPP-p DMA, and 8.70% 2,4-DP-p DMA, which corresponds to 14.3% ae MCPA, 7.5% ae MCPP-p, and 7.3% ae 2,4-DP-p.

Tank mix: A tank mix analysis was conducted as part of this study. A single sample was collected from the spray tank after the application of each treatment. The samples were placed in sealed amber glass bottles and stored refrigerated prior to shipment. The tank mix sample was shipped to the analytical laboratory, stored refrigerated, and analyzed using GC/MSD. Tank mix samples ranged from 84-128% of theoretical.

Travel Recovery: Travel recovery samples were not used in this study.

Storage Stability: A separate storage stability study was not conducted.

II. RESULTS AND CALCULATIONS

The Registrant provided TTRs in ng/cm². Field recoveries were not provided. The Registrant did not correct the data for laboratory recoveries. Versar corrected the TTRs using the average concurrent recovery for 2,4-D, MCPA, MCPP, dicamba, or 2,4-DP from each site. TTR values reported as below the LOD were assigned a value of ½ LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

TTR values calculated by Versar are provided in Tables 4-5, 6-7, 8-13, and 14-19 for TRT 2, TRT 3, TRT 4, and TRT 5, respectively.

At the CA site, the highest average TTR values occurred 12 hrs after the application and residues were still above the LOQ at the last sampling interval (7 days after treatment; DAT) for all analytes and all treatments. At the WI site, the highest average TTR values occurred 1 hr after application for TRT 2 and TRT 3, and 8 hrs after application for TRT 4 and TRT 5 (except for MCPP in TRT 4, in which the highest average residue occurred 1 hr after application). Residues dropped to below the LOQ by 1DAT for all analytes and all treatments at the WI site. The lower residues and earlier maximum TTR values at the WI site are likely due to rainfall during sampling. Rain began to fall lightly during the 8-hr sampling interval, after samples for treatments 1 and 2 had been collected. TTR cloths collected in treatments 3-5 were damp from the falling rain during sampling. A total of 0.025 inch fell by the end of the 8-hr sampling interval. An additional 0.145 inches fell between the 8- and 12-hr sampling (0.17 inch total for the day). All subsequent TFR samples were damp resulting from humid conditions (dew or overnight rainfall). A summary of the highest average TTR values for each treatment type is provided below.

- **TRT 2 (Amine 400 2,4-D Weed Killer):** The highest average TTR values (and percent of application rate) for 2,4-D were 0.571 µg/cm² (3.06%) at the CA site and 0.236 µg/cm² (1.28%) at the WI site.
- **TRT 3 (Clean Crop MCP Amine 4):** The highest average TTR values (and percent of application rate) for MCPA were 1.04 µg/cm² (6.28%) at the CA site and 0.134 µg/cm² (0.798%) at the WI site.

- **TRT 4 (EH-1358 Herbicide):** The highest average TTR values (and percent of application rate) were 1.08 $\mu\text{g}/\text{cm}^2$ (5.81%) for 2,4-D, 0.396 $\mu\text{g}/\text{cm}^2$ (5.68%) for MCP, and 0.160 $\mu\text{g}/\text{cm}^2$ (6.84%) for dicamba at the CA site; corresponding TTR values (and percent application rate) at the WI site were 0.184 $\mu\text{g}/\text{cm}^2$ (1.00%) for 2,4-D, 0.051 $\mu\text{g}/\text{cm}^2$ (0.745%) for MCP, and 0.026 $\mu\text{g}/\text{cm}^2$ (1.13%) for dicamba.
- **TRT 5 (Triamine II Optical):** The highest average TTR values (and percent of application rate) were 1.67 $\mu\text{g}/\text{cm}^2$ (10.1%) for MCP, 1.01 $\mu\text{g}/\text{cm}^2$ (12.0%) for 2,4-DP, and 0.911 $\mu\text{g}/\text{cm}^2$ (10.5%) for MCP at the CA site; corresponding TTR values (and percent application rate) at the WI site were 0.993 $\mu\text{g}/\text{cm}^2$ (5.98%) for MCP, 0.565 $\mu\text{g}/\text{cm}^2$ (6.65%) for 2,4-DP, and 0.487 $\mu\text{g}/\text{cm}^2$ (5.57%) for MCP.

The Registrant did not perform a regression analysis on the data generated in this study. Versar also did not perform a linear regression analysis due to the nature of the dissipation pattern (i.e. peak residues generally observed at the 8- or 12-hr sampling interval).

A graphical representation of residue dissipation after treatment is presented in Figures 1, 2, 3-4, and 5-6 for TRT 2, TRT 3, TRT 4, and TRT 5, respectively.

III DISCUSSION:

A. LIMITATIONS OF THE STUDY:

This study met the majority of the Series 875.2100 Guidelines. The following minor issues of concern are noted:

- The production of metabolites, breakdown products, or the presence of contaminants of concern were not discussed in the Study Report.
- The EPA guidelines recommend that initiating testing immediately before rainfall should be avoided. At the Wisconsin location, rain began to fall lightly during the 8-hr sampling interval, after samples for treatments 1 and 2 had been collected. Therefore, TTR cloths collected in treatments 3-5 were damp from the falling rain during sampling. A total of 0.025 inch fell by the end of the 8 hr sampling. An additional 0.145 inches fell between the 8- and 12-hr sampling interval (0.17 inch total for the day). All subsequent TTR samples were damp resulting from humid conditions (dew or overnight rainfall). Residues declined to <LOQ by 1 day after treatment.
- The test product Amine 400 2,4-D Weed Killer (TRT 2) was applied at a rate of 1.67 lb ae/A, which is slightly higher than the maximum label rate of 1.5 lb ae/A for turf applications. It is unknown whether applications made with EH-1358 Herbicide (TRT 4) and Triamine II Optical (TRT 5) were at the maximum label rate, as labels were not provided.
- The results from this study are based on findings from only two test sites; the EPA guidelines recommend using three geographically distinct locations for each formulation.
- At the Wisconsin site, temperature, precipitation, wind speed, and humidity data were not provided for the duration of the study. Temperature, rainfall, and wind velocity was provided for the day of application.
- The recoveries obtained from the field fortifications were very low and were not reported or

used for correction of field data. The study authors thought the low recoveries were a result of interference caused by the acid interaction of the fortification solution with the cotton during storage.

- Raw residue data should be corrected for field fortification recovery levels up to 120%. Field fortification data was not provided and no corrections were performed by the petitioner. Versar corrected the TTRs using the average concurrent recovery for 2,4-D, MCPA, MCPP, dicamba, or 2,4-DP from each site.

B. CONCLUSIONS:

The TTR values calculated by the Registrant and Versar were similar, though there were slight differences because Versar corrected the field data for average concurrent recoveries ranging from 88% to 103% and the Registrant did not apply any corrections.

Table 4. 2,4-D TTR Residues for California Turf Treated with Amine 400 2,4-D Weed Killer ¹ – TRT 2								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.2610	0.2522	0.2338	0.0285	12.2	-1.45	0.233	1.251
	0.2570	0.2483						
	0.2080	0.2010						
4 hr DAT	0.1980	0.1913	0.2139	0.0218	10.2	-1.54	0.213	1.144
	0.2430	0.2348						
	0.2230	0.2155						
8 hr DAT	0.1180	0.1140	0.1240	0.0133	10.8	-2.09	0.124	0.664
	0.1230	0.1188						
	0.1440	0.1391						
12 hr DAT	0.4630	0.4474	0.5714	0.1076	18.8	-0.56	0.564	3.057
	0.6630	0.6406						
	0.6480	0.6261						
1DAT	0.0653	0.0631	0.0502	0.0111	22.2	-2.99	0.049	0.269
	0.0449	0.0434						
	0.0458	0.0443						
2DAT	0.0569	0.0550	0.0520	0.0051	9.87	-2.96	0.052	0.278
	0.0477	0.0461						
	0.0569	0.0550						
3DAT	0.0463	0.0447	0.0537	0.0078	14.5	-2.93	0.053	0.287
	0.0593	0.0573						
	0.0610	0.0589						
4DAT	0.0626	0.0605	0.0465	0.0124	26.6	-3.07	0.046	0.249
	0.0382	0.0369						
	0.0437	0.0422						
7DAT	0.0452	0.0437	0.0333	0.0103	30.9	-3.40	0.032	0.178
	0.0343	0.0331						
	0.0239	0.0231						

1. One application was made at a rate of rate 1.67 lb ae/A (18.7 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.0000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (103%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.2430	0.2770	0.2360	0.0358	15.2	-1.44	0.234	1.275
	0.1930	0.2200						
	0.1850	0.2109						
4 hr DAT	0.1990	0.2269	0.2193	0.0427	19.5	-1.52	0.216	1.185
	0.1520	0.1733						
	0.2260	0.2577						
8 hr DAT	0.1430	0.1630	0.1386	0.0288	20.8	-1.98	0.136	0.749
	0.1280	0.1459						
	0.0937	0.1068						
12 hr DAT	0.1650	0.1881	0.1249	0.0623	49.9	-2.08	0.114	0.675
	0.1080	0.1231						
	0.0557	0.0635						
1DAT	<LOQ	0.0004	0.0010	0.0005	48.7	-6.90	0.0009	0.005
	0.0011	0.0013						
	0.0011	0.0013						
2DAT	<LOQ	0.0004	0.0004	0.0000	0.00	-7.73	0.0004	0.002
	<LOQ	0.0004						
	<LOQ	0.0004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						

1. One application was made at a rate of rate 1.65 lb ae/A (18.5 µg/cm²).
2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.
3. Residues were corrected for the overall concurrent recovery (87.7%).
4. Highest average residue is **bolded**.
5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 6. MCPA TTR Residues for California Turf Treated with Clean Crop MCP Amine 4 ¹ – TRT 3								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.1660	0.1717	0.1710	0.0362	21.2	-1.77	0.168	1.033
	0.2000	0.2069						
	0.1300	0.1345						
4 hr DAT	0.1930	0.1996	0.1278	0.0644	50.4	-2.06	0.118	0.772
	0.1050	0.1086						
	0.0726	0.0751						
8 hr DAT	0.0619	0.0640	0.0751	0.0276	36.7	-2.59	0.072	0.454
	0.0530	0.0548						
	0.1030	0.1065						
12 hr DAT	0.4940	0.5110	1.0392	0.4865	46.8	0.04	0.949	6.276
	1.4200	1.4688						
	1.1000	1.1378						
1DAT	0.0380	0.0393	0.0369	0.0169	45.8	-3.30	0.034	0.223
	0.0183	0.0189						
	0.0507	0.0524						
2DAT	0.0525	0.0543	0.0362	0.0162	44.8	-3.32	0.034	0.219
	0.0303	0.0313						
	0.0222	0.0230						
3DAT	0.0406	0.0420	0.0264	0.0163	61.8	-3.63	0.022	0.160
	0.0270	0.0279						
	0.0091	0.0094						
4DAT	0.0169	0.0175	0.0139	0.0041	29.8	-4.27	0.013	0.084
	0.0144	0.0149						
	0.0091	0.0094						
7DAT	0.0047	0.0048	0.0050	0.0028	55.8	-5.29	0.004	0.030
	0.0077	0.0080						
	0.0023	0.0024						

1. One application was made at a rate of rate 1.48 lb ae/A (16.6 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (96.7%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 7. MCPA TTR Residues for Wisconsin Turf Treated with Clean Crop MCP Amine 4 ¹ – TRT 3								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.1240	0.1265	0.1336	0.0317	23.7	-2.01	0.131	0.798
	0.1650	0.1683						
	0.1040	0.1061						
4 hr DAT	0.0763	0.0778	0.0912	0.0142	15.6	-2.39	0.090	0.545
	0.1040	0.1061						
	0.0879	0.0897						
8 hr DAT	0.0409	0.0417	0.0624	0.0181	29.0	-2.77	0.060	0.372
	0.0739	0.0754						
	0.0686	0.0700						
12 hr DAT	0.0455	0.0464	0.0488	0.0045	9.18	-3.02	0.049	0.291
	0.0451	0.0460						
	0.0529	0.0540						
1DAT	<LOQ	0.0004	0.0004	0.0000	0.00	-7.73	0.0004	0.003
	<LOQ	0.0004						
	<LOQ	0.0004						
2DAT	<LOQ	0.0004	0.0004	0.0000	0.00	-7.73	0.0004	0.003
	<LOQ	0.0004						
	<LOQ	0.0004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						

1. One application was made at a rate of rate 1.49 lb ae/A (16.7 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (98.0%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 8. 2,4-D TTR Residues for California Turf Treated with EH-1358 Herbicide¹ – TRT 4

Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.1370	0.1324	0.1459	0.0146	10.0	-1.92	0.145	0.783
	0.1670	0.1614						
	0.1490	0.1440						
4 hr DAT	0.1190	0.1150	0.1346	0.0176	13.0	-2.01	0.134	0.722
	0.1450	0.1401						
	0.1540	0.1488						
8 hr DAT	0.0995	0.0961	0.0893	0.0157	17.6	-2.42	0.088	0.479
	0.1040	0.1005						
	0.0738	0.0713						
12 hr DAT	0.8200	0.7923	1.0822	0.2657	24.5	-0.08	1.059	5.805
	1.1800	1.1401						
	1.3600	1.3140						
1DAT	0.0791	0.0764	0.0667	0.0109	16.4	-2.71	0.066	0.358
	0.0568	0.0549						
	0.0713	0.0689						
2DAT	0.0823	0.0795	0.0675	0.0107	15.8	-2.70	0.067	0.362
	0.0660	0.0638						
	0.0612	0.0591						
3DAT	0.0535	0.0517	0.0465	0.0065	13.9	-3.07	0.046	0.249
	0.0502	0.0485						
	0.0406	0.0392						
4DAT	0.0259	0.0250	0.0263	0.0015	5.80	-3.64	0.026	0.141
	0.0269	0.0260						
	0.0290	0.0280						
7DAT	0.0282	0.0272	0.0233	0.0034	14.7	-3.76	0.023	0.125
	0.0222	0.0214						
	0.0219	0.0212						

1. One application was made at a rate of rate 1.66 lb ae/A (18.6 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (103%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 9. MCP P TTR Residues for California Turf Treated with EH-1358 Herbicide ¹ – TRT 4								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.0661	0.0684	0.0674	0.0078	11.5	-2.70	0.067	0.964
	0.0720	0.0745						
	0.0571	0.0591						
4 hr DAT	0.0602	0.0623	0.0606	0.0055	9.16	-2.80	0.060	0.867
	0.0628	0.0650						
	0.0525	0.0543						
8 hr DAT	0.0325	0.0336	0.0311	0.0056	17.9	-3.47	0.031	0.446
	0.0338	0.0350						
	0.0239	0.0247						
12 hr DAT	0.2770	0.2868	0.3958	0.1048	26.5	-0.93	0.386	5.667
	0.3910	0.4048						
	0.4790	0.4959						
1DAT	0.0205	0.0212	0.0188	0.0024	12.7	-3.97	0.019	0.269
	0.0159	0.0165						
	0.0181	0.0187						
2DAT	0.0080	0.0083	0.0129	0.0044	33.7	-4.35	0.012	0.185
	0.0163	0.0169						
	0.0131	0.0136						
3DAT	0.0059	0.0061	0.0057	0.0005	9.60	-5.17	0.006	0.081
	0.0056	0.0058						
	0.0049	0.0051						
4DAT	0.0037	0.0038	0.0029	0.0008	27.8	-5.86	0.003	0.041
	0.0023	0.0024						
	0.0024	0.0024						
7DAT	0.0009	0.0009	0.0008	0.0003	37.7	-7.16	0.001	0.011
	0.0009	0.0010						
	<LOQ	0.0004						

1. One application was made at a rate of rate 0.62 lb ae/A (7.0 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (96.6%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 10. Dicamba TTR Residues for California Turf Treated with EH-1358 Herbicide – TRT 4								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.0226	0.0224	0.0220	0.0027	12.5	-3.82	0.022	0.945
	0.0248	0.0246						
	0.0193	0.0191						
4 hr DAT	0.0226	0.0224	0.0216	0.0018	8.42	-3.84	0.022	0.926
	0.0231	0.0229						
	0.0197	0.0195						
8 hr DAT	0.0132	0.0131	0.0123	0.0019	15.6	-4.40	0.012	0.527
	0.0138	0.0137						
	0.0102	0.0101						
12 hr DAT	0.1140	0.1129	0.1595	0.0447	28.0	-1.84	0.155	6.840
	0.1650	0.1634						
	0.2040	0.2021						
1DAT	0.0058	0.0058	0.0050	0.0007	13.6	-5.29	0.005	0.216
	0.0045	0.0044						
	0.0050	0.0049						
2DAT	0.0058	0.0058	0.0049	0.0010	21.4	-5.32	0.005	0.209
	0.0052	0.0051						
	0.0038	0.0037						
3DAT	0.0037	0.0036	0.0036	0.0001	3.50	-5.62	0.004	0.155
	0.0038	0.0037						
	0.0035	0.0035						
4DAT	0.0033	0.0033	0.0026	0.0006	24.2	-5.96	0.003	0.111
	0.0022	0.0021						
	0.0024	0.0023						
7DAT	0.0017	0.0017	0.0014	0.0004	26.1	-6.59	0.001	0.059
	0.0015	0.0015						
	0.0010	0.0010						

1. One application was made at a rate of rate 0.21 lb ae/A (2.3 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (101%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

2,4-D/030001

Table 11. 2,4-D TTR Residues for Wisconsin Turf Treated with EH-1358 Herbicide ¹ – TRT 4								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.1170	0.1334	0.1361	0.0111	8.14	-1.99	0.136	0.741
	0.1300	0.1482						
	0.1110	0.1266						
4 hr DAT	0.0929	0.1059	0.1022	0.0136	13.3	-2.28	0.102	0.556
	0.0995	0.1134						
	0.0764	0.0871						
8 hr DAT	0.1470	0.1676	0.1843	0.0156	8.44	-1.69	0.184	1.004
	0.1640	0.1870						
	0.1740	0.1984						
12 hr DAT	0.0982	0.1120	0.1040	0.0330	31.7	-2.26	0.100	0.566
	0.0594	0.0677						
	0.1160	0.1323						
1DAT	<LOQ	0.0004	0.0004	0.0000	0.00	-7.73	0.0004	0.002
	<LOQ	0.0004						
	<LOQ	0.0004						
2DAT	<LOQ	0.0004	0.00004	0.0000	0.00	-7.73	0.0004	0.002
	<LOQ	0.0004						
	<LOQ	0.0004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.002
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						

1. One application was made at a rate of rate 1.64 lb ae/A (18.4 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (87.7%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 12. MCPP TTR Residues for Wisconsin Turf Treated with EH-1358 Herbicide ¹ – TRT 4								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.0611	0.0592	0.0513	0.0068	13.3	-2.97	0.051	0.745
	0.0490	0.0475						
	0.0488	0.0473						
4 hr DAT	0.0310	0.0300	0.0303	0.0003	0.977	-3.50	0.030	0.440
	0.0316	0.0306						
	0.0312	0.0302						
8 hr DAT	0.0424	0.0411	0.0423	0.0028	6.59	-3.16	0.042	0.615
	0.0417	0.0404						
	0.0470	0.0455						
12 hr DAT	0.0249	0.0241	0.0222	0.0071	32.2	-3.81	0.021	0.322
	0.0147	0.0142						
	0.0290	0.0281						
1DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
2DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						

1. One application was made at a rate of rate 0.61 lb ae/A (6.9 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (103%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 13. Dicamba TTR Residues for Wisconsin Turf Treated with EH-1358 Herbicide ¹ – TRT 4								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.0222	0.0231	0.0203	0.0024	12.0	-3.90	0.020	0.883
	0.0182	0.0189						
	0.0181	0.0188						
4 hr DAT	0.0140	0.0146	0.0146	0.0001	0.821	-4.22	0.015	0.637
	0.0142	0.0148						
	0.0140	0.0146						
8 hr DAT	0.0233	0.0243	0.0258	0.0029	11.4	-3.66	0.026	1.125
	0.0231	0.0240						
	0.0281	0.0293						
12 hr DAT	0.0085	0.0088	0.0122	0.0032	26.0	-4.40	0.012	0.532
	0.0123	0.0128						
	0.0145	0.0151						
1DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.002
	<LOD	0.00004						
	<LOD	0.00004						
2DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.002
	<LOD	0.00004						
	<LOD	0.00004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.002
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.002
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.002
	<LOD	0.00004						
	<LOD	0.00004						

1. One application was made at a rate of rate 0.21 lb ae/A (2.3 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (96.1%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

2,4-D/030001

Table 14. MCPA TTR Residues for California Turf Treated with Triamine II Optical ¹ – TRT 5								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.2190	0.2265	0.2179	0.0123	5.66	-1.52	0.218	1.320
	0.1970	0.2038						
	0.2160	0.2234						
4 hr DAT	0.1760	0.1820	0.2048	0.0301	14.7	-1.59	0.203	1.240
	0.1870	0.1934						
	0.2310	0.2389						
8 hr DAT	0.0857	0.0886	0.0764	0.0184	24.1	-2.57	0.075	0.463
	0.0824	0.0852						
	0.0534	0.0552						
12 hr DAT	1.6800	1.7377	1.6688	0.0790	4.73	0.51	1.668	10.11
	1.6300	1.6860						
	1.5300	1.5826						
1DAT	0.0646	0.0668	0.0645	0.0048	7.39	-2.74	0.064	0.391
	0.0571	0.0591						
	0.0655	0.0678						
2DAT	0.0566	0.0585	0.0578	0.0007	1.27	-2.85	0.058	0.350
	0.0557	0.0576						
	0.0552	0.0571						
3DAT	0.0417	0.0431	0.0338	0.0081	24.1	-3.39	0.033	0.204
	0.0285	0.0295						
	0.0277	0.0287						
4DAT	0.0189	0.0195	0.0193	0.0003	1.64	-3.95	0.019	0.117
	0.0183	0.0189						
	0.0187	0.0193						
7DAT	0.0066	0.0068	0.0082	0.0019	23.6	-4.80	0.008	0.050
	0.0072	0.0074						
	0.0101	0.0104						

1. One application was made at a rate of rate 1.47 lb ae/A (16.5 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (96.7%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 15. 2,4-DP TTR Residues for California Turf Treated with Triamine II Optical ¹ – TRT 5								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.1210	0.1301	0.1373	0.0163	11.9	-1.99	0.137	1.626
	0.1450	0.1559						
	0.1170	0.1258						
4 hr DAT	0.0944	0.1015	0.0994	0.0019	1.87	-2.31	0.099	1.177
	0.0914	0.0983						
	0.0914	0.0983						
8 hr DAT	0.0459	0.0494	0.0425	0.0099	23.2	-3.16	0.042	0.504
	0.0437	0.0470						
	0.0290	0.0312						
12 hr DAT	0.9800	1.0539	1.0119	0.0468	4.63	0.01	1.011	11.99
	0.9490	1.0205						
	0.8940	0.9614						
1DAT	0.0313	0.0337	0.0324	0.0020	6.14	-3.43	0.032	0.384
	0.0280	0.0301						
	0.0311	0.0334						
2DAT	0.0320	0.0344	0.0330	0.0017	5.29	-3.41	0.033	0.392
	0.0313	0.0337						
	0.0289	0.0311						
3DAT	0.0190	0.0204	0.0164	0.0037	22.6	-4.11	0.016	0.194
	0.0146	0.0157						
	0.0122	0.0131						
4DAT	0.0086	0.0093	0.0094	0.0003	3.29	-4.66	0.009	0.112
	0.0086	0.0093						
	0.0091	0.0098						
7DAT	0.0035	0.0037	0.0044	0.0010	23.3	-5.42	0.004	0.052
	0.0052	0.0056						
	0.0037	0.0039						

1. One application was made at a rate of rate 0.75 lb ae/A (8.4 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (93.0%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 16. MCPP TTR Residues for California Turf Treated with Triamine II Optical ¹ – TRT 5								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.1240	0.1284	0.1360	0.0178	13.1	-2.00	0.135	1.563
	0.1510	0.1563						
	0.1190	0.1232						
4 hr DAT	0.0951	0.0984	0.0953	0.0028	2.92	-2.35	0.095	1.095
	0.0901	0.0933						
	0.0909	0.0941						
8 hr DAT	0.0452	0.0468	0.0402	0.0093	23.1	-3.21	0.039	0.463
	0.0428	0.0443						
	0.0286	0.0296						
12 hr DAT	0.9030	0.9348	0.9113	0.0508	5.58	-0.09	0.910	10.48
	0.9140	0.9462						
	0.8240	0.8530						
1DAT	0.0293	0.0303	0.0288	0.0020	7.06	-3.55	0.029	0.331
	0.0256	0.0265						
	0.0286	0.0296						
2DAT	0.0260	0.0269	0.0266	0.0006	2.25	-3.63	0.027	0.305
	0.0260	0.0269						
	0.0250	0.0259						
3DAT	0.0150	0.0155	0.0122	0.0029	23.8	-4.40	0.012	0.141
	0.0108	0.0112						
	0.0097	0.0100						
4DAT	0.0058	0.0060	0.0064	0.0003	5.26	-5.05	0.006	0.074
	0.0064	0.0066						
	0.0064	0.0066						
7DAT	0.0024	0.0024	0.0020	0.0004	18.7	-6.21	0.002	0.023
	0.0017	0.0017						
	0.0018	0.0019						

1. One application was made at a rate of rate 0.78 lb ae/A (8.7 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (96.6%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 17. MCPA TTR Residues for Wisconsin Turf Treated with Triamine II Optical ¹ – TRT 5								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.1700	0.1734	0.1758	0.0363	20.6	-1.74	0.173	1.059
	0.1380	0.1408						
	0.2090	0.2132						
4 hr DAT	0.1490	0.1520	0.1241	0.0247	19.9	-2.09	0.123	0.748
	0.1130	0.1153						
	0.1030	0.1051						
8 hr DAT	0.3500	0.3571	0.9930	0.7137	71.9	-0.01	0.814	5.981
	0.8400	0.8570						
	1.7300	1.7650						
12 hr DAT	0.0686	0.0700	0.0658	0.0068	10.3	-2.72	0.066	0.396
	0.0568	0.0579						
	0.0681	0.0695						
1DAT	<LOQ	0.0004	0.0004	0.0000	0.00	-7.73	0.0004	0.003
	<LOQ	0.0004						
	<LOQ	0.0004						
2DAT	<LOQ	0.0004	0.0003	0.0002	74.2	-8.09	0.0002	0.002
	<LOD	0.00004						
	<LOQ	0.0004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.000
	<LOD	0.00004						
	<LOD	0.00004						

1. One application was made at a rate of rate 1.48 lb ae/A (16.6 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.0000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (98.0%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 18. 2,4-DP TTR Residues for Wisconsin Turf Treated with Triamine II Optical ¹ – TRT 5								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.0972	0.0974	0.0966	0.0207	20.8	-2.31	0.098	1.172
	0.0799	0.0800						
	0.1210	0.1212						
4 hr DAT	0.0848	0.0850	0.0705	0.0128	18.1	-2.65	0.070	0.830
	0.0657	0.0658						
	0.0606	0.0607						
8 hr DAT	0.2060	0.2064	0.5651	0.3990	70.6	-0.57	0.466	6.650
	0.4930	0.4939						
	0.9930	0.9949						
12 hr DAT	0.0362	0.0363	0.0341	0.0038	11.0	-3.38	0.034	0.401
	0.0297	0.0298						
	0.0362	0.0363						
1DAT	<LOQ	0.0004	0.0004	0.0000	0.00	-7.73	0.0004	0.005
	<LOQ	0.0004						
	<LOQ	0.0004						
2DAT	<LOQ	0.0004	0.0002	0.0002	130	-8.65	0.0001	0.002
	<LOD	0.00004						
	<LOD	0.00004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						

1. One application was made at a rate of rate 0.76 lb ae/A (8.5 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (99.8%).

4. Highest average residue is **bolded**.

5. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

Table 19. MCPP TTR Residues for Wisconsin Turf Treated with Triamine II Optical ¹ – TRT 5								
Sample Interval	Turf Transferable Residue ² (µg/cm ²)	Corrected Residue Level ³ (µg/cm ²)	Arithmetic Mean ⁴ (µg/cm ²)	Standard Deviation (µg/cm ²)	Coefficient of Variance (%)	Natural Log of Mean (µg/cm ²)	Geomean (µg/cm ²)	% original app rate transferred ⁵
-1DAT	<LOD	<LOD	<LOD	NA	NA	NA	NA	NA
1 hr DAT	0.0955	0.0925	0.0950	0.0201	21.1	-2.35	0.094	1.087
	0.0788	0.0763						
	0.1200	0.1162						
4 hr DAT	0.0802	0.0777	0.0643	0.0117	18.2	-2.74	0.064	0.736
	0.0615	0.0596						
	0.0575	0.0557						
8 hr DAT	0.1800	0.1744	0.4873	0.3505	71.9	-0.72	0.399	5.573
	0.4350	0.4214						
	0.8940	0.8660						
12 hr DAT	0.0318	0.0308	0.0288	0.0033	11.5	-3.55	0.029	0.329
	0.0258	0.0250						
	0.0316	0.0306						
1DAT	<LOQ	0.0004	0.0004	0.0000	0.00	-7.73	0.0004	0.0005
	<LOQ	0.0004						
	<LOQ	0.0004						
2DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
3DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
4DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						
7DAT	<LOD	0.00004	0.00004	0.0000	0.00	-10.03	0.00004	0.001
	<LOD	0.00004						
	<LOD	0.00004						

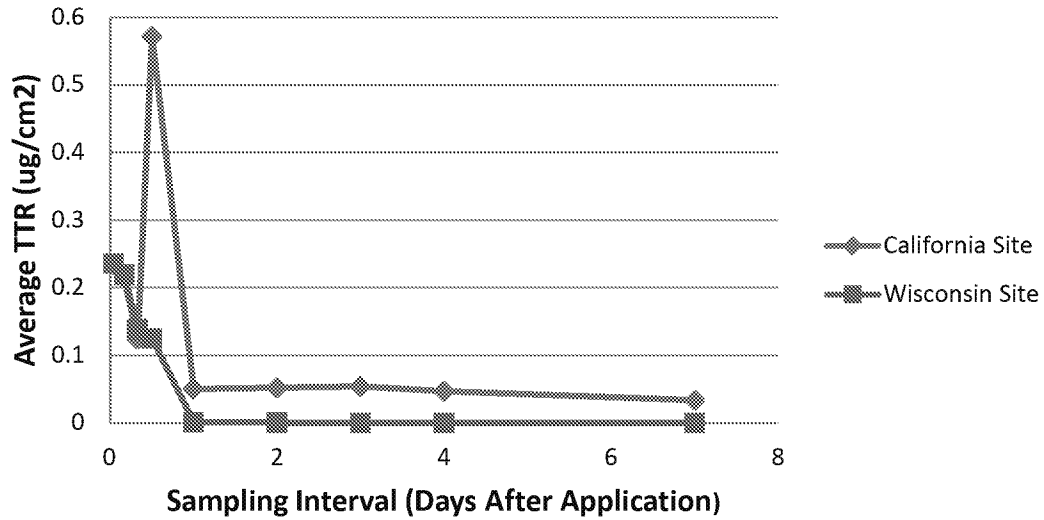
1. One application was made at a rate of rate 0.78 lb ae/A (8.7 µg/cm²).

2. LOQ = 0.000879 µg/cm². LOD = 0.000879 µg/cm². For statistical calculations, residues <LOD were assigned a value of ½ the LOD and values between the LOD and the LOQ were assigned a value of ½ LOQ.

3. Residues were corrected for the overall concurrent recovery (103%).

4. Percent of Original Application Rate Transferred = TTR corrected (µg/cm²) / Amount applied (µg/cm²) x 100%.

**Figure 1 Average 2,4-D Residues After One Amine 400 2,4-D
Weed Killer Application (TRT 2)**



**Figure 2 Average MCPA Residues After One Clean Crop MCP
Amine 4 Application (TRT 3)**

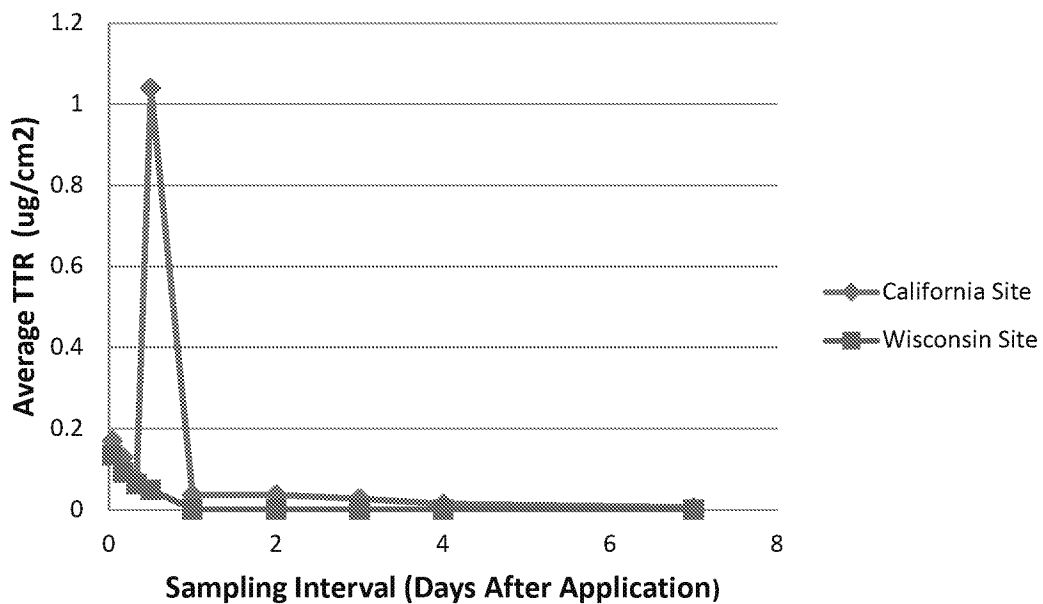


Figure 3 Average 2,4-D , MCPP, and Dicamba Residues After One EH-1358 Herbicide Application (TRT 4 - CA Site)

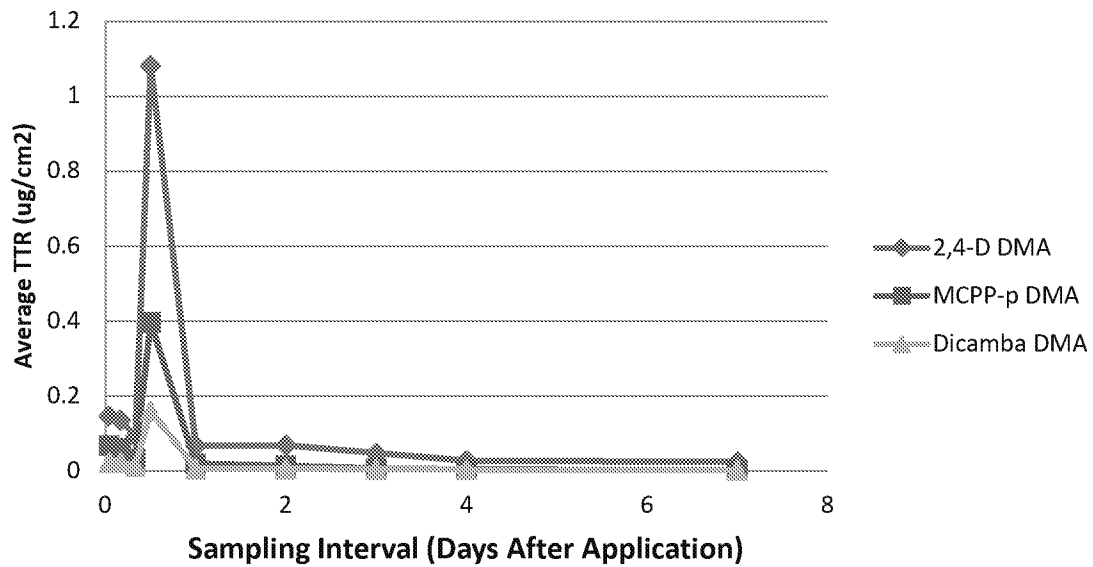


Figure 4 Average 2,4-D , MCPP, and Dicamba Residues After One EH-1358 Herbicide Application (TRT 4 - WI Site)

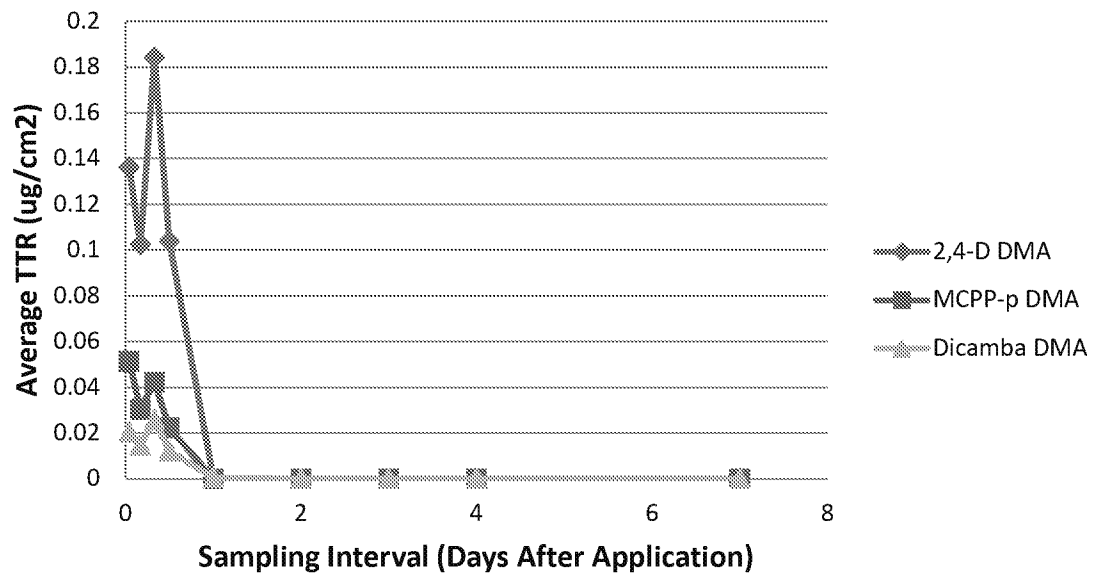


Figure 5 Average MCPA, 2,4-DP, and MCPP Residues After One Triamine II Optical Application (TRT 5 - CA Site)

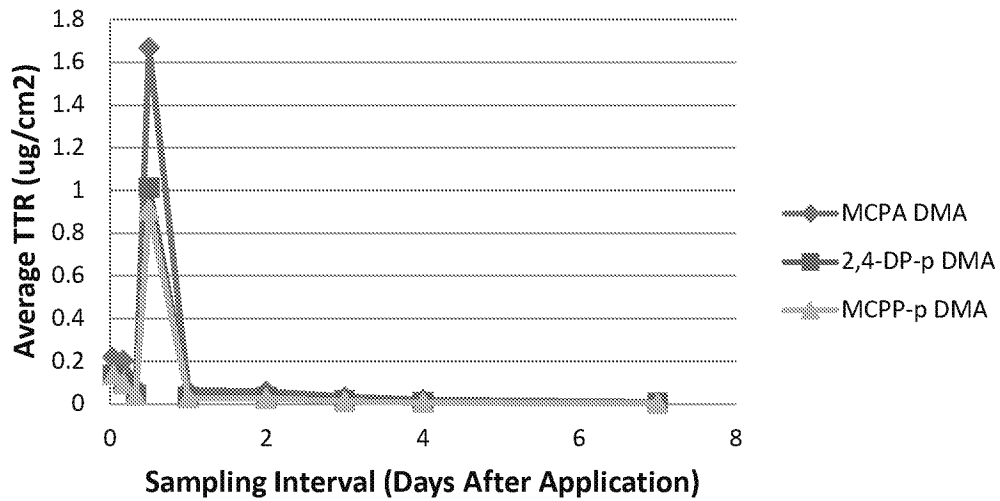
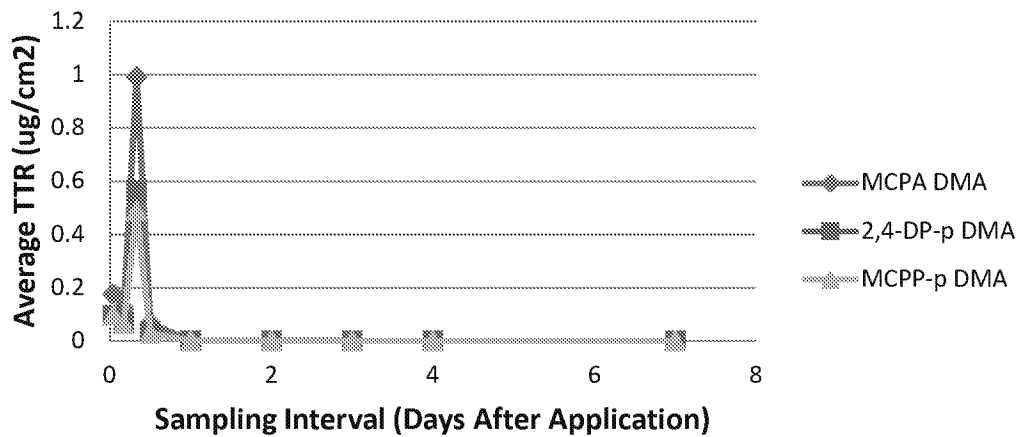


Figure 6 Average MCPA, 2,4-DP, and MCPP Residues After One Triamine II Optical Application (TRT 5 - WI Site)



Name:
Evaluator
Occupational Exposure Assessment Section

Date

Name:
Peer Reviewer
Occupational Exposure Assessment Section

Date

Name:
Head,
Occupational Exposure Assessment Section

Date

APPENDIX A

Compliance Checklist for

“Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA, MCPA DMA, 2,4-D DMA + MCPP-p DMA + Dicamba DMA and MCPA DMA + MCPP-p DMA + 2,4-DP-p DMA”

Compliance Checklist for “Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA, MCPA DMA, 2,4-D DMA + MCPP-p DMA + Dicamba DMA and MCPA DMA + MCPP-p DMA + 2,4-DP DMA”

Compliance with OPPTS Series 875, Occupational and Residential Exposure Test Guidelines, Group B: Post-application Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turf, is critical. The itemized checklist below describes compliance with most of the major technical aspects of OPPTS 875.2100.

- *The test substance must be the typical end use product of the active ingredient.* This criterion was met.
- *The production of metabolites, breakdown products, or the presence of contaminants of concern, should be considered in the study design on a case-by-case basis.* It is not certain if this criterion was met. The study does not provide information on presence or absence of metabolites, breakdown products, or contaminants of potential toxicologic concern.
- *Applications should occur at the time of season that the end-use product is normally applied to achieve intended pest control.* This criterion was met.
- *Initiating testing immediately before a precipitation event should be avoided. Applications should be made after mowing and watering.* These criteria were partially met. There were no rain events during the trial period at the California site. At the Wisconsin location, rain began to fall lightly during the 8-hr sampling interval, after samples for treatments 1 and 2 had been collected. Therefore, TTR cloths collected in treatments 3-5 were damp from the falling rain during sampling. A total of 0.025 inch fell by the end of the 8 hr sampling. An additional 0.145 inches fell between the 8- and 12-hr sampling interval (0.17 inch total for the day). All subsequent TTR samples were damp resulting from humid conditions (dew or overnight rainfall).
- *The end use product should be applied by the application method recommended. Formulations which can be applied in a minimal amount of water and do not require "watering in" should be used. Information that verifies that the application equipment (e.g., sprayer) was properly calibrated should be included.* These criteria were met.
- *The application rate used in the study should be provided and should be the maximum rate specified on the label. However, monitoring following application at a typical application rate is more appropriate in certain cases.* This criterion was partially met. The maximum label rate was used for application of Clean Crop MCP Amine 4 (TRT 3). Application of Amine 400 2,4-D Weed Killer (TRT 2) reflects a slightly higher treatment rate than the proposed maximum label rate (1.67 vs 1.5 lb ae/A) for Spring application use on turf. A proposed label for EH-1358 Herbicide and Triamine II Optical (TRTs 4 and 5) were not provided. Thus, it is unknown if the test substance was applied at the maximum rate.
- *If multiple applications are made, the minimum allowable interval between applications should be used.* This criterion is not applicable, only one application was made.
- *Turf transferable residue (TTR) data should be collected from at least three geographically distinct locations for each formulation. The sites should be representative of the regions (and turf types) where the chemical is used.* This criterion was not met. Data from only two test sites (California and Wisconsin) were submitted.

- *The site(s) treated should be representative of reasonable worst-case climatic conditions expected in intended use areas. Meteorological conditions including temperature, wind speed, daily rainfall, and humidity should be provided for the duration of the study.* This criterion was partially met. It is not certain if this site was representative of reasonable worst-case climatic conditions. Temperature, wind speed, rainfall, and humidity were not reported at the Wisconsin site.
- *Sampling should be sufficient to characterize the dissipation mechanisms of the compound (e.g., three half-lives or 35 days after the final application, unless the compound has been found to fully dissipate in less time; for more persistent pesticides, longer sampling periods may be necessary). Sampling intervals may be relatively short in the beginning and lengthen as the study progresses. Background samples should be collected before application of the test substance occurs.* This criterion was partially met. Residues were still detectable at the last sampling interval at the CA site (7DAT). Half-lives were not calculated due to the pattern of the residues.
- *Triplicate, randomly collected samples should be collected at each sampling interval.* This criterion was met.
- *Samples should be collected using a suitable methodology (e.g., California Cloth Roller, Polyurethane Roller, Drag Sled, etc.) for turf.* This criterion was met. Turf residue samples were collected using the Modified California Roller protocol.
- *Control plots should be established from which sufficient control samples can be collected. Control sites should be upwind and a reasonable distance from the treatment site.* These criteria were met.
- *Residues should be dislodged from turf within a reasonable time period (i.e., EPA recommends that dislodging occur within 4 hours). Other transferable method samples should be handled in a manner that is appropriate to the method used.* This criterion was met. The modified California cloth roller methodology was used in the conduct of this study.
- *Samples should be stored in a manner that will minimize deterioration and loss of analytes between collection and analysis. Information on storage stability should be provided.* These criteria were not met. A storage stability study was not performed. The recoveries obtained from the field fortifications were very low and were not reported or used for correction of field data. These low recoveries were thought to be the result of interference caused by the acid interaction of the fortification solution with the cotton during storage.
- *Validated analytical methods of sufficient sensitivity are needed. Information on method efficiency (residue recovery), and limit of quantitation (LOQ) should be provided.* These criteria were most met. The method was validated in Covance Study 6926-102. The limit of quantitation (LOQ) was 0.000879 $\mu\text{g}/\text{cm}^2$.
- *Information on recovery samples must be included in the study report. A complete set of field recoveries should consist of at least one blank control sample and three or more each of a low-level and high-level fortification. These fortifications should be in the range of anticipated residue levels in the field study.* This criterion was not met. The recoveries obtained from the field fortifications were very low and were not reported or used for correction of field data. These low recoveries were thought to be the result of interference caused by the acid interaction of the fortification solution with the cotton during storage.
- *Raw residue data must be corrected if appropriate recovery values are less than 90 percent.* This criterion was not met. Field fortification data was not provided and no corrections were performed by

the petitioner. Versar corrected the TTRs using the average concurrent recovery for 2,4-D, MCPA, MCPP, dicamba, or 2,4-DP from each site.

- *Residue data should be expressed as $\mu\text{g}/\text{cm}^2$.* This criterion was not met. Residue data was expressed as ng/cm^2 .